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Research Article

Ex-situ Studies of Captive Breeding of *Ompok bimaculatus* (Bloch, 1794) in Tripura

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Abstract: Broodstock (37 males and 83 females) of *Ompok bimaculatus* was sampled from Rivers Feni, Muhuri, Gomoti and also from Hurijala wetland of Tripura during November 2008 to February 2010. During sampling of fish species, water samples from different locations were also sampled in order to know the water quality characteristics of the habitat. The broodstock was provided specific live feed and water quality during acclimatization. The maturity cycle of the species was examined with gonad during the monsoon period. During breeding season the gravid females and males were identified with some specific phenotypic characteristics. Induced spawning was done under some particular aquaculture conditions only.

Keywords: *Ompok bimaculatus*, Breeding, Culture.

1. Introduction

Ompok bimaculatus (Bloch, 1794) is a freshwater catfish species native to India, Bangladesh, Pakistan and Myanmar belong to the family Siluridae of the order Siluriformes. The fish has a wide geographical distribution covering West Bengal, Bihar and North Eastern States of India as well. Open Beel or wetland connected with rivers are usually considered as common habitats. *O. bimaculatus* is a higher priced, delicious and well preferred fish because of its unique lipoprotein texture with soft bones, good taste and higher nutritional value. This species has been listed as endangered fish species in India (IUCN, 1990) due to its decrease in abundance and restricted distribution. Causes of decline are likely to be indiscriminate fishing during the breeding season, wide use of pesticide from agricultural fields and gradual siltation in riverine habitat. In aquaculture it did not receive much attention due to insufficiency of gravid stock for experimentation and also because of the shortage of information regarding its breeding potential, larval rearing and culture technology (Parameswaran *et al.*, 1970; CAMP, 1998; Banik, 2009, 2010a, 2010b, 2011; Banik *et al.*, 2002; Malla and Banik, 2010).

2. Results and Discussion

2.1 Broodstock Collection and management

Brood fishes of 1-2 years old (37 males and 83 females) of *O. bimaculatus* were sampled from river Feni, Muhuri, Gomati and also from Hurijala wetland during November 2008-February 2010. They were stocked (length: 25-40cm and weight: 50-190g) at the Udaipur Aquaculture Farm, Tripura in Post- stocking pond (0.32 ha, depth 2.5-3.9 m). The brood fishes were maintained in a polyculture system. Aquatic macrophytes like *Hydrilla verticillata* and *Eichhornia crassipes* etc. were introduced into the pond for maintaining niche. After 1-2 months of acclimatization, the fishes were considered for captive breeding (Banik *et al.*, 2002).

2.2 Water quality management

Different physicochemical parameters of water were analyzed adopting the methodology of APHA

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(2002) which was maintained in the broodstock pond (Table 1).

Table 1. Physicochemical characteristics of water maintained in stocking the pond.

S. No.	Parameter	Range
1	Water Temperature	29 ± 2.2^{0}C
2	pH	7.5 ± 0.92
3	Dissolved Oxygen	7.0 ± 2.32 ppm
4	Free CO_2	4.3 ± 2.12 ppm
5	Turbidity	2.5 ± 1.1 cm
6	Carbonate	60 ± 5.70 ppm
7	Bicarbonate	120 ± 27.10 ppm
8	Ammonia	Less than 0.1 ppm
9	Nitrate	Less than 0.01 ppm
10	Phosphate	Less than 10-20 ppm
11	Suspended Solids	Less than 2-5 ppm

2.3 Feed Management

The brood fishes of *Ompok bimaculatus* (Bloch) were fed with mass cultured rotifers along with small live prawns, trash fishes and mustard oil cake etc. (2:1) @ 5-10% of the body weight per day for about 1-2 months. Adult *O. bimaculatus* were reared in farm stocking ponds with proper feeding. The broodstock so developed to attain a body size of about 15.5 – 18.5cm /45g-115g. Spawners were fed with mass cultured rotifers @ 18 –25% of stocked biomass.

2.4 Breeding Season and Maturation

O. bimaculatus was observed during the first year. The maturity cycle of the species was studied by examining of gonads in different months. During November – January the fishes were in stage I and II of maturity. Most of them attained stages III of maturity in March. The majority of the males were matured during late March-April, while the bulk of females were only in stage IV. Fully ripe females were observed during May to the end of July. Breeding season extends from early June to late July.

2.5 Selection of breeders

During breeding season (June - August), fully ripe females and males are selected. Male and female identify with their secondary sexual character developed during breeding season. These are comb like and swollen with milt but do not normally yield the contents with slight pressure on abdomen near the vent and males have an elongated and pointed genital papilla. Females are with soft bulging abdomen for enlargement of the balloon shaped hard roes, reddish vent colour and rounded genital papilla. The pectoral fin spine, which relatively longer and thicker in male than female, become more prominent.

2.6 Induced Spawning

During June-July 2009 and 2010 altogether 52 individuals weighing about 4.05 kg (mean wt=97.88 g/individual) of mature females were induced bred and fertilized with spermatozoan suspension from the adult males. Ovaprim was used as at different dosages. Hatching time has been recorded @ 23 – 24 hours after fertilization at about 27 – 32^{0}C. Absorption of yolk sack has been noticed within 3 – 4 days of hatching. A total of 52 females was considered for induced breeding. Of which about 87.90% responded to the application of breeding technology. The average fertilization rate is being 72%. A total of 0.09 lakh spawns stage was grown and developed during 2010. Of this, about 5450 individuals were reared into the fry stage (Table 2).

During experimentation, the acclimatized brood stockfishes were taken from the post-stocking carp pond through repeated netting as well as segregation and then were transferred into breeding hapa for acclimatization further for about 7 to 8 hrs. For promoting gamete production in both female and male as well as for influencing fertilization, Ovaprim was applied (Chaudhary, 1976). Ovaprim so applied was at 0.58 – 1.28ml/kg body weight of the fish individuals. Females were stripped for spawning for about 5–9 hours after hormone injection. The number of eggs developed was varied from 1068-5892. Eggs were cleaned thoroughly with sterilized water and transferred into a cemented tank for hatching, with constant aeration @ 5.4-6.7 ppm of DO_2. After completion of spawning growth and development of the hatching was progressed through intensive exercise of the larvae inside the eggshell. Hatching occurred at about 23-25 hrs after spawning and the hatchlings were light yellow in colour. The survival of the hatchling varied from 51-72% (Bhowmick *et al.*, 2000; Mukherjee and Das 2001; Chakrabarty *et al.*, 2006 & 2007).

2.7 Egg Collection and Incubation

A simple flow through system comprises a stand on which is placed a row of plastic tubs (12cm diameter, 6cm height). Constant supply of water is arranged from an overhead tank through a pipe to all the tubs with individual control taps. Each tub is provided with an outlet as a height of above 4cm which draws into a common conduit to drain out water. The fertilized eggs are generally distributed uniformly in the plastic tubs and a feeble current of water is provided to maintain good water quality. Water temperature between 27 – 30^{0}C is maintained for hatching. Hatching occurs after 22 – 24 hours of fertilization. The newly hatched larvae are cylindrical in shape, transparent and devoid of mouth, pectoral fin and body pigments, yolk sack pale greenish in colour gets absorbed in three days. Rudiment of one pair of maxillary and two pair of mandibular barbels appears. Post larval phase lasts from 4thday to the 15th day of life, when they resemble with adult in respect of contour and pigmentation. The caudal, dorsal and ventral fins are fully formed (Chakrabarty *et al.*, 2008).

Table 2. Results of Captive breeding experiments using different doses of Ovaprim.

No. of Experiment	Average weight of female (g)	Ovaprim dosage (ml/kg of body weight)	Average weight of Male (g)	Ovaprim dosage (ml/kg body weight)	Latency Period (hr)	No. of eggs spawned	Fertilization (%)	Hatching (%)	No. of hatchlings produced
1	287	1.5	210	0.5	5-6	3254	62%	51%	1028
2	217	1.0	175	0.5	7-8	5892	75%	66%	2916
3	224	0.5	190	0.5	8-9	3054	78%	55%	1310
4	233	1.5	180	0.5	5-6	2544	66%	65%	1091
5	212	1.0	160	0.5	7-8	4756	80%	72%	2739

2.8 Embryonic Development

Study of embryonic and larval development stages of *O. bimaculatus* was made and salient distinguishing characters are enumerated as below:

a) Ovary: Eggs - Uniform size; Diameter: 0.858-1.365mm; Colour: Brown.
b) Fertilized Eggs: Diameter of zona radiate, vitelline membrane and egg proper are 1.712-1.921mm, 1.225-1.429mm and 1.190-1.360mm respectively; Colour: Radish brown.
c) Embryo: Size - Colour of yolk- brown just hatched larvae: Size -3.701mm, yolk sac- brown, Pre-anal myotomes – 11; Post-anal myotomes – 37-40.
d) Post-larvae: Yolk just absorbed – Length: 4.268mm Colour - Less translucent; brownish melanophores minute and numerous and almost uniformly distributed. Maxillary barbels: Reach beyond commencement of anal fine -67-68 rays.
e) Colour: Dark brownish; no longitudinal bands; no yellow bands; melanophores more numerous and concentrated on the back. Shoulder spot - conspicuous, Caudal spot - fully formed, Maxillary barbels -Reach beyond the commencement of the anal fin, anal fin - Narrow with 67-68 rays (Mukherjee *et al*., 2002; Hussain, 2006; Chakrabarty *et al*., 2008).

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